Regional Representations in NEMS and POEMS

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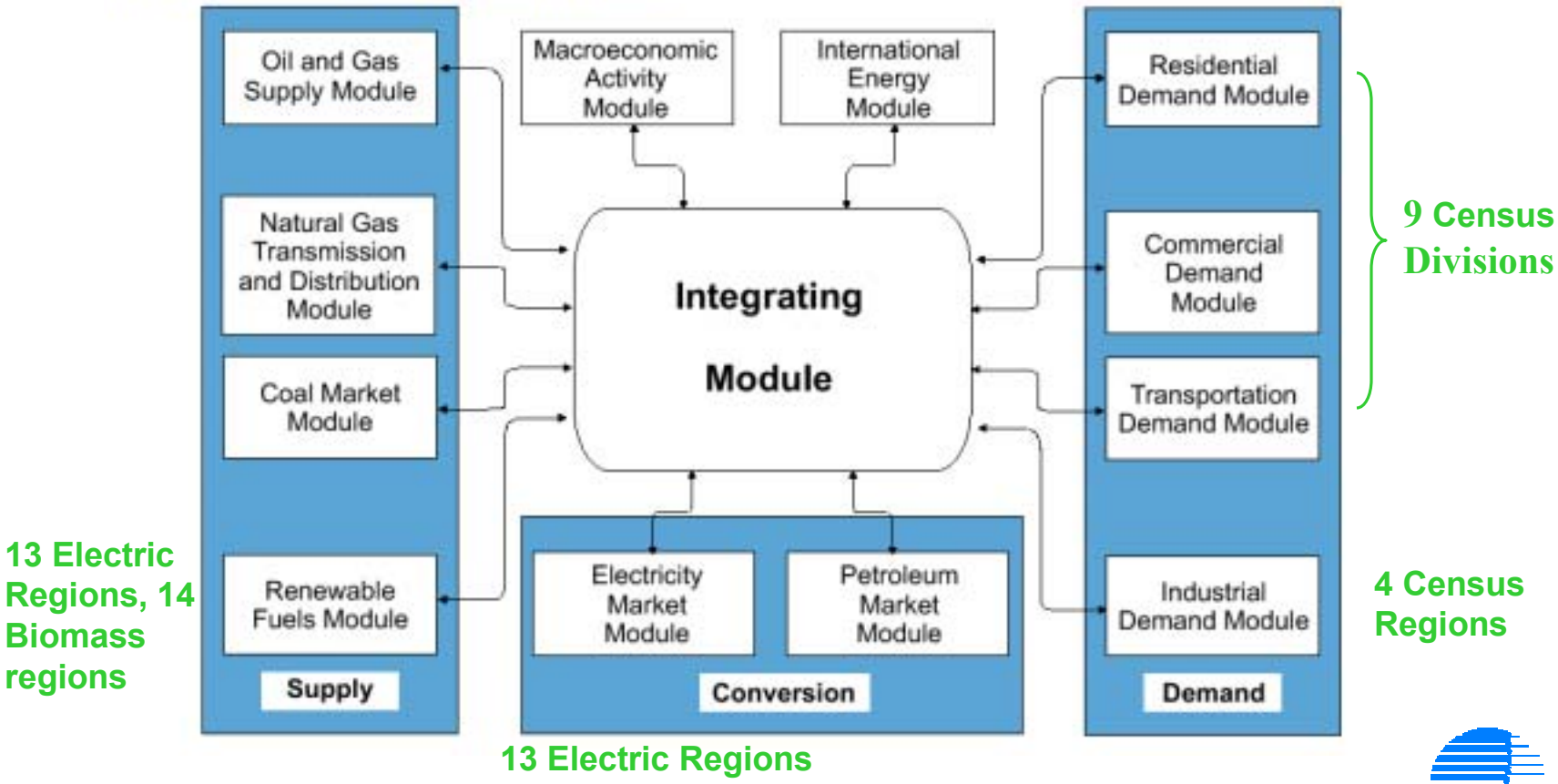
Overview of NEMS

- NEMS represents the U.S. energy system through a set of supply, conversion and demand modules.

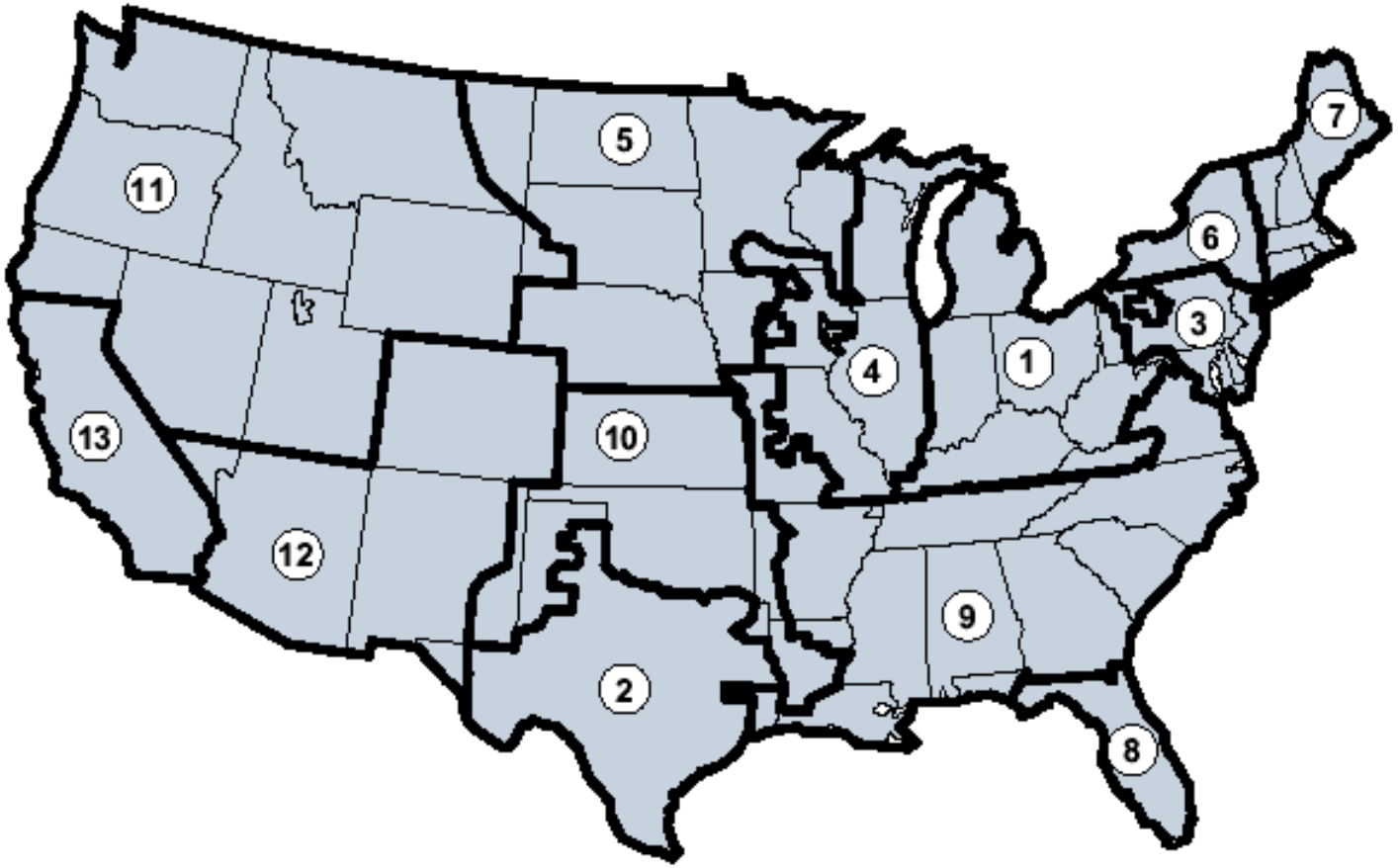


Census Divisions and Regions

- Census divisions are used in most of the energy demand models.

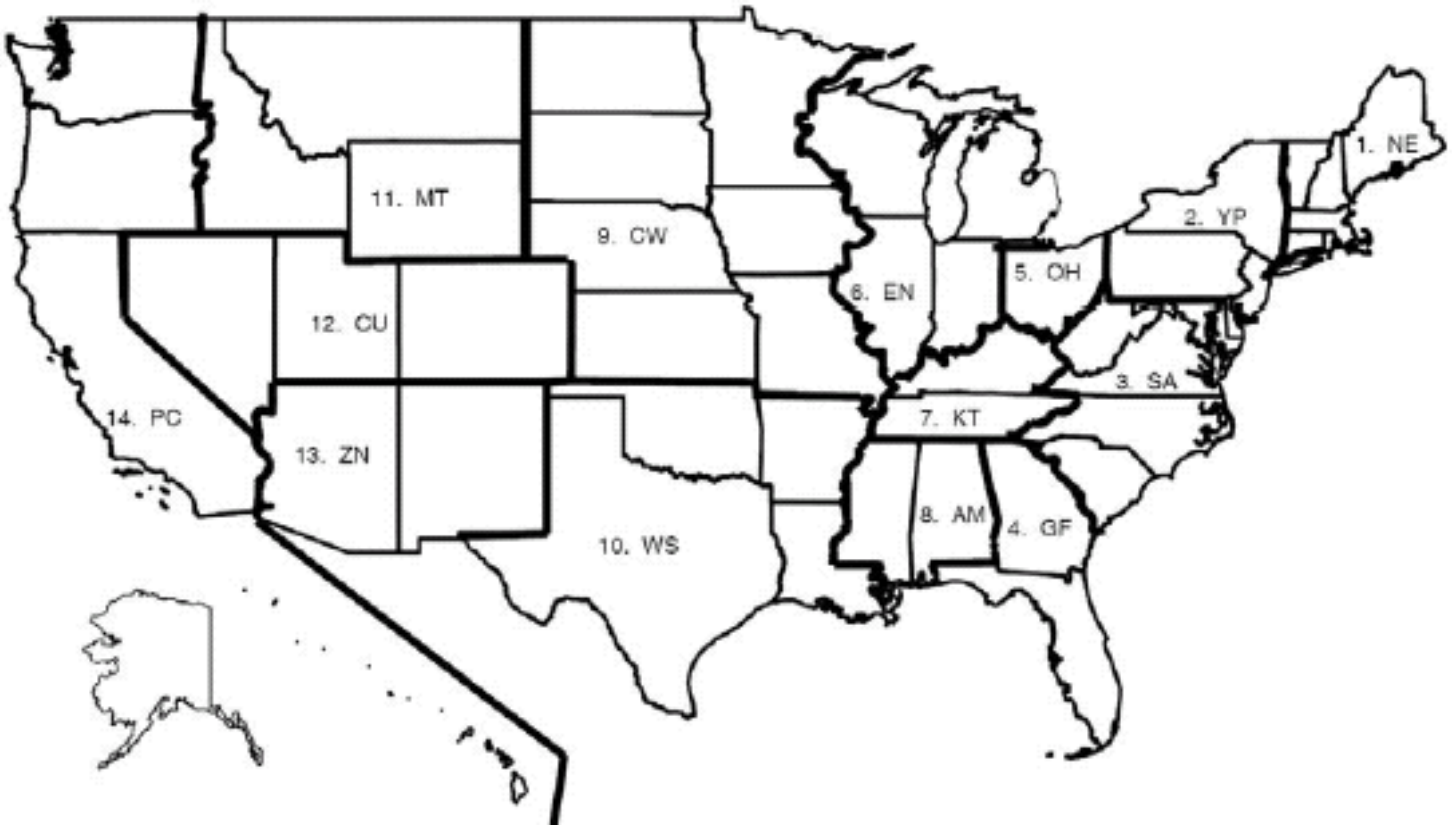
Electricity Regions

- Electricity supply regions are based on the National Electricity Reliability Council (NREC) regions.



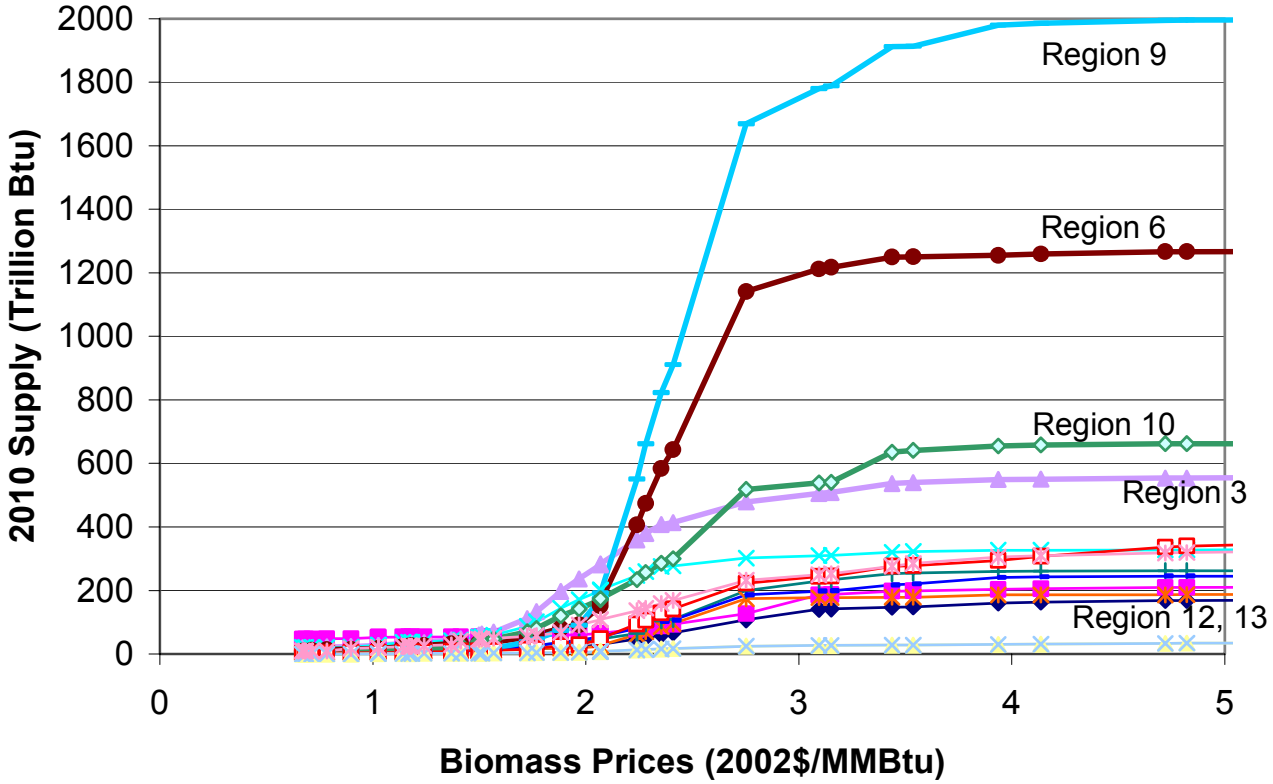
Biomass Regions

- The biomass regions are a further disaggregation of the Census Divisions and follow state boundaries.



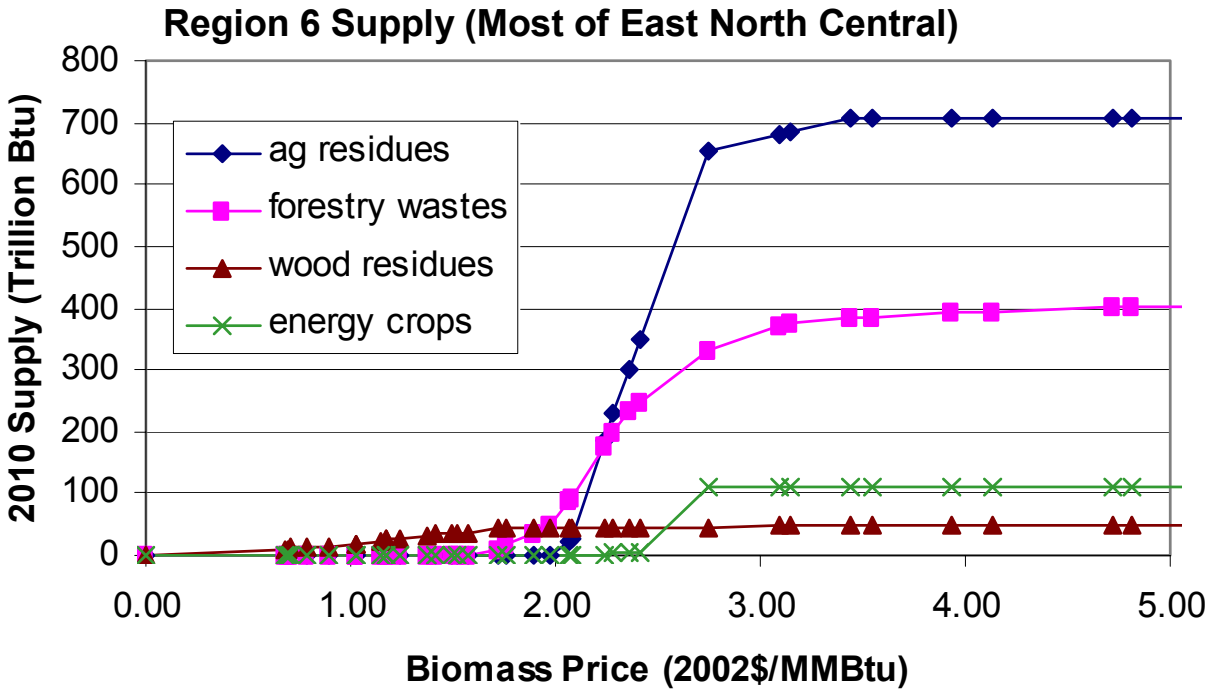
Biomass Supply Curves

- Each of the 14 regions has a supply curve by year that is constructed from county level data of different biomass types.



Biomass Component Example

- Supply curves for each of four types of biomass are used to construct the overall supply for each region.

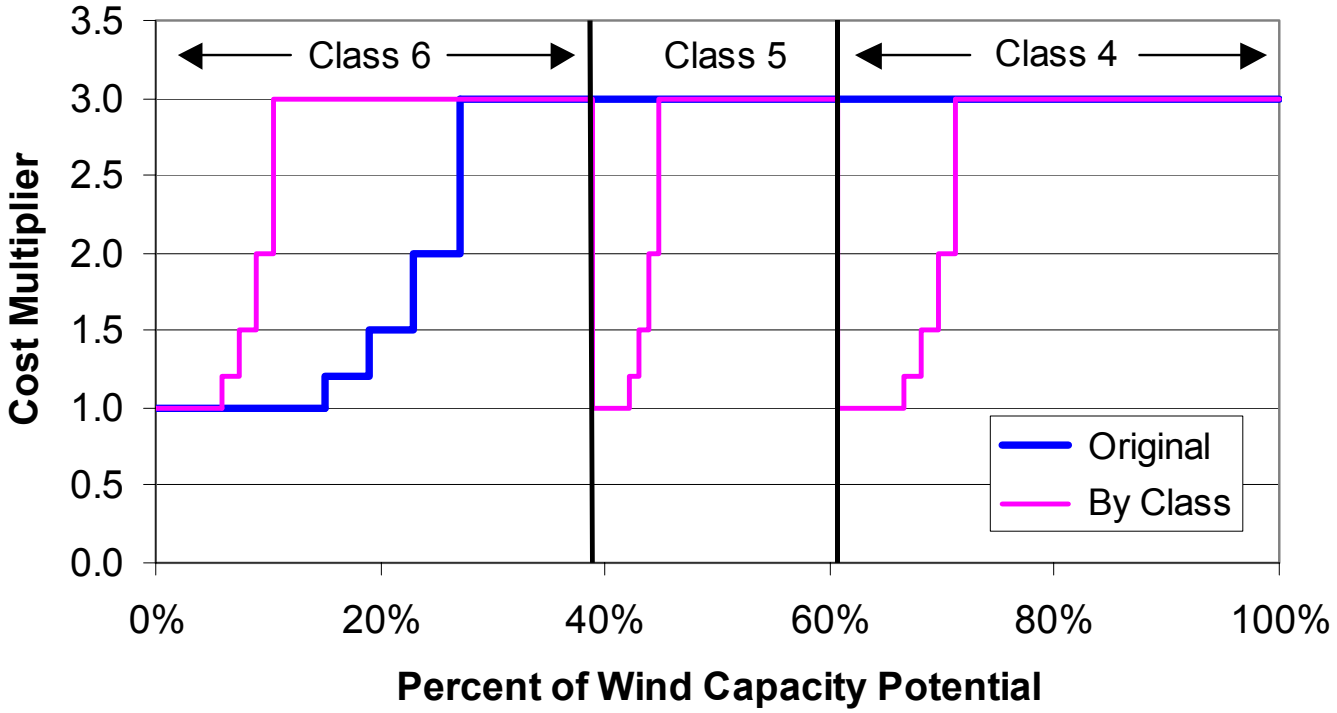


Wind Resources

- Wind resources are represented by 3 wind classes within each region
- Each class and region is further divided into three categories of transmission costs
- In addition each region's wind resource is characterized by 5 cost steps, independent of wind class
  - Work is underway to redefine these supply curve steps by wind class

Wind Supply Curves

- The cost multipliers effectively create regional supply curves.



Geothermal Resources

- Unlike the other renewables, geothermal resources are characterized for 51 individual sites.
- All are in the West: California, Northwest or Southwest
- Each has a unique set of capital cost components, O&M costs, and heat rates.
- A learning function for capital cost reductions apply to all sites uniformly.

Solar

Concentrated Solar Power (CSP)

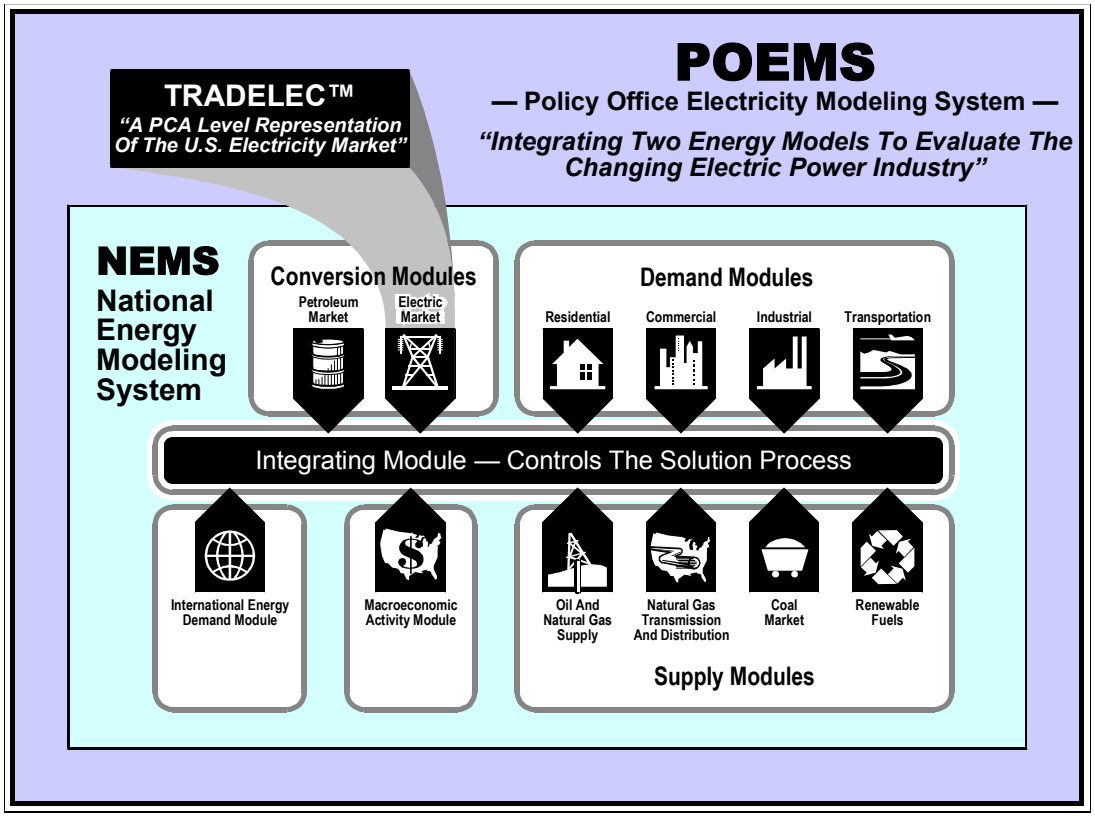
- CSP is allowed to compete in all regions west of the Mississippi river
- A profile of electrical output (capacity factors) is supplied for each region for each of 9 time periods in the year

Photovoltaic Systems (PV)

- PV systems are represented by a central station size plant within the electricity system and by rooftop systems in the residential and commercial buildings models.
- For the utility systems, capacity factors are specified for the 9 time periods by region
- For the buildings systems, regional capacity factors are computed based on typical insolation values.

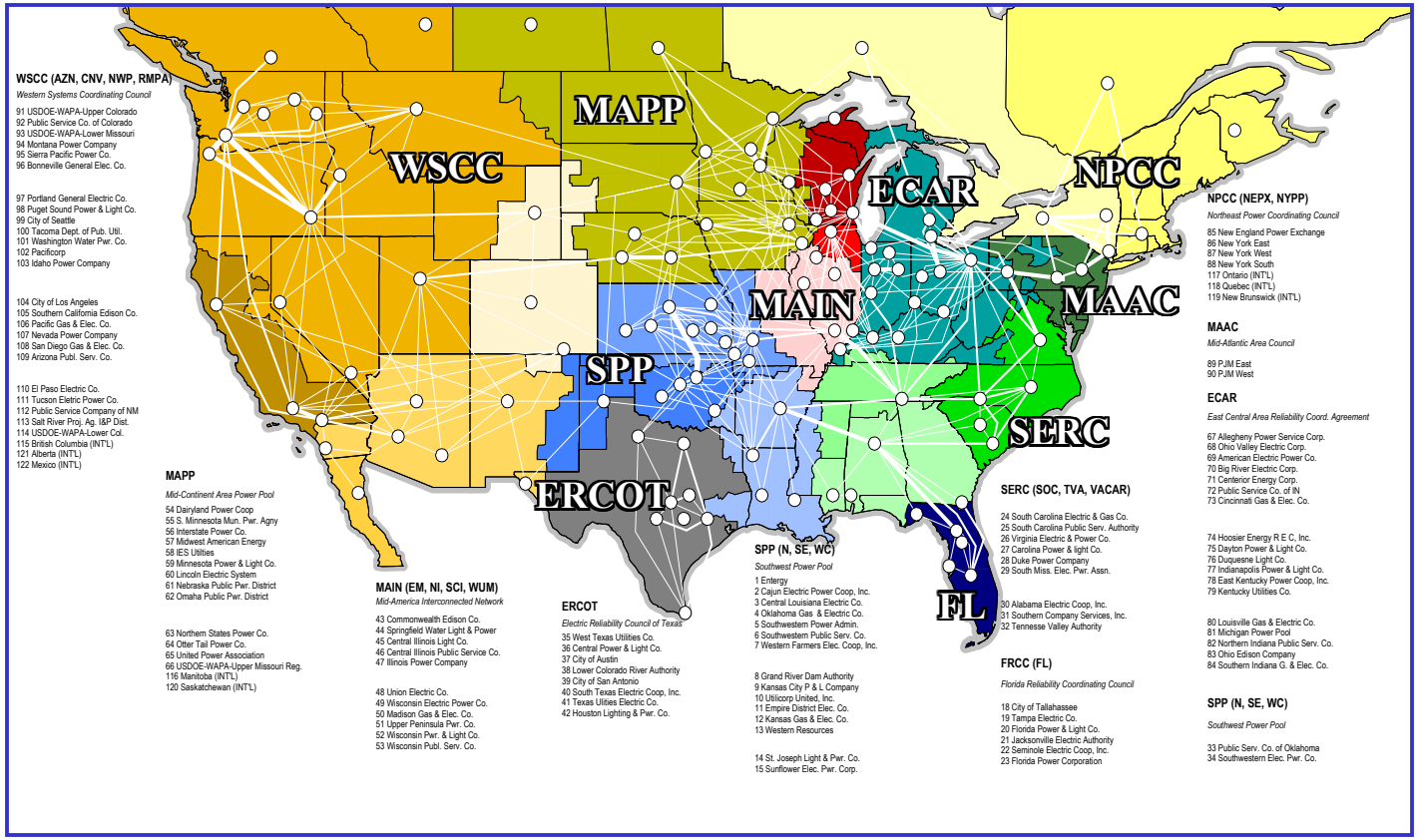
POEMS Overview

- POEMS replaces the electricity sector of NEMS with a more detailed trading model.



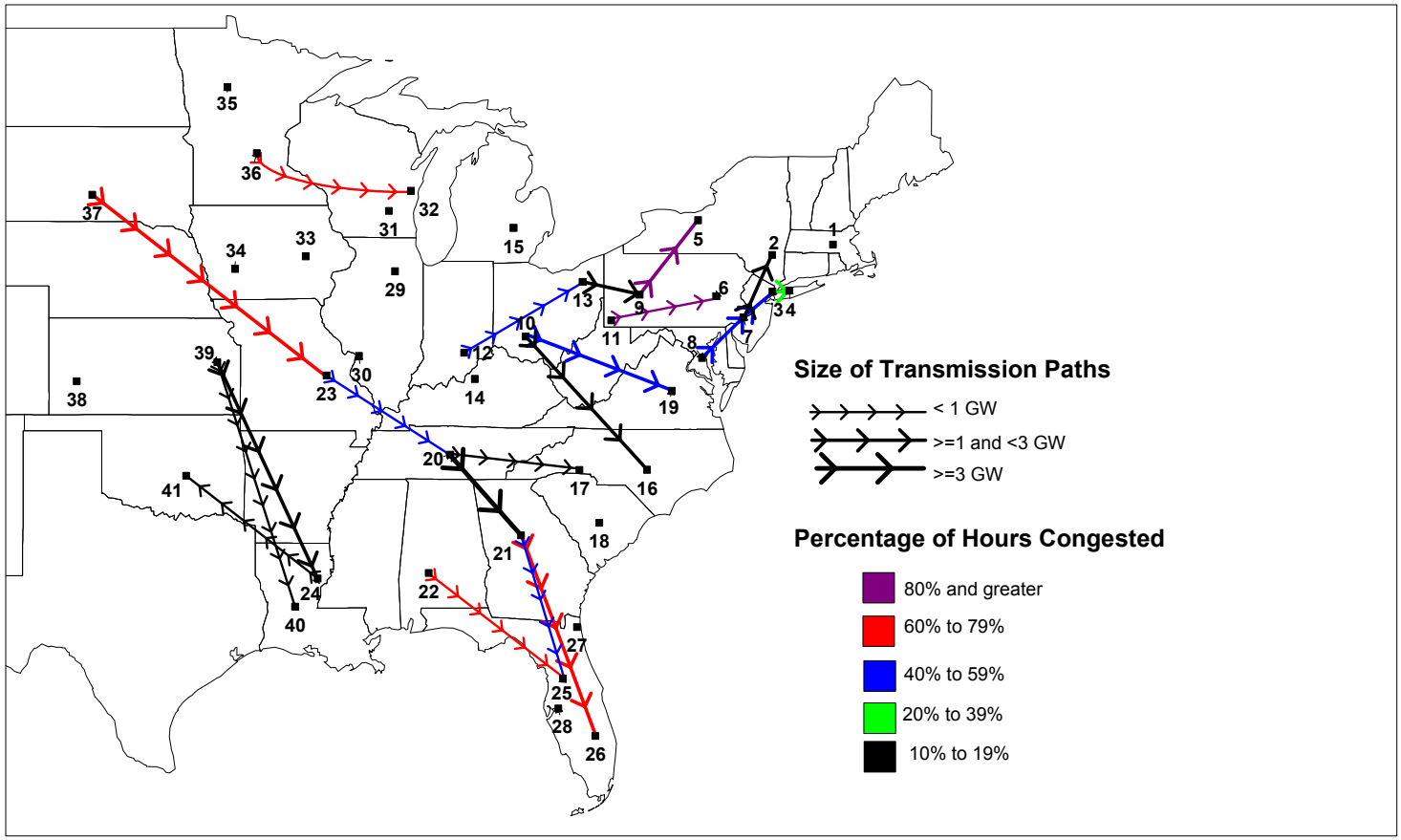
POEMS Regions PCA Level

- The regions are based on power control areas, and POEMS has been configured with 66 to 128 regions.



Transmission Congestion

- One application has been to examine the propensity for congestion on major transmission paths.



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